

Monitoring Emerging Contaminants in Water Supplies

MONITORING LEVELS OF CHEMICALS IN WATER IS ONE TYPE OF ENVIRONMENTAL MONITORING. BEYOND THE GOALS OF DISCOVERING WHAT CONTAMINANTS, IN WHAT QUANTITIES, ARE IN THE WATER SUPPLY, WATER MONITORING CAN PROVIDE INFORMATION ABOUT THE BEHAVIOR, INTERACTIVITY, AND PERSISTENCE OF WATER CONTAMINANTS.

Emerging Contaminants

At the BCERF Cancer and Environment Forum on June 10, 2005, Patrick Phillips of the United States Geological Survey (USGS) in Troy, New York, spoke about that agency's efforts to monitor contaminants in water.

Mr. Phillips focused on the area of emerging contaminants: chemicals (synthetic or natural) that have not been monitored in the past but that enter the environment and may have the potential to cause adverse ecological or human health effects. There is an increased ability to study these emerging contaminants because scientists have recently developed more sensitive methods to detect lower levels of chemicals, and are gaining a better understanding of their environmental fate.

Discharge of industrial chemicals from manufacturing plants and run-off of chemicals from agricultural practices have been the focus of some monitoring efforts by federal agencies. Emerging contaminants entering the waste stream can also include household chemicals, human and veterinary pharmaceuticals, and personal care products – chemicals from these other points of use are just beginning to receive attention.

Focused USGS Efforts

Several programs are now actively collecting water-monitoring data. At the USGS, the National Water Quality Assessment (NAWQA) program, the Toxic Substances Hydrology (Toxics) program, and the Biomonitoring of Environmental Status and Trends (BEST) program are approaching the water monitoring issue each from slightly different directions.

The NAWQA program tracks changes in river basins and aquifers over time. The program is collecting consistent, long-term data that can be used to compare changes

and provide information about how human activities affect the water sources.

The **Toxics** program focuses on the behavior of toxic substances in water and specifically on three areas of inquiry:

- **Improving measurement:** developing methods to measure contaminants at low levels in all stages of their transportation and ultimate fate.
- **Revealing processes:** learning how chemicals migrate, transform, and degrade in the water supply.
- **Understanding environmental health:** mapping the ultimate fate of contaminants and understanding potential effects on human and environmental health, describing the effects of contaminants on organisms, ecosystems, and the food chain. Developing simulation models, designing waste-disposal facilities, monitoring networks, and remediation plans.

The **BEST** program examines the response of biological resources to contaminants. This program is measuring and assessing the effects of contaminants on species and habitats, developing tools and processes for biomonitoring and application, and delivering the tools to the US Department of the Interior for use on federal lands.

In a report released in 2002, titled "Pharmaceuticals, Hormones, and Other Organic Wastewater Contaminants in US Streams, 1999-2000: A National Reconnaissance," the USGS measured concentrations of 95 organic wastewater contaminants in 139 streams across 30 states (Kolpin, 2002). The study found 82 of the 95 target contaminants in samples. The compounds found most frequently were coprostanol (fecal steroid), cholesterol (plant and animal steroid), N, N-diethyltoluamide

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(DEET), caffeine, triclosan (antimicrobial disinfectant), tri(2-chloroethyl)phosphate (fire retardant), and 4-nonylphenol (estrogenic detergent metabolite).

The report, which is available online (see **References and Resources**), highlights that water monitoring is in its beginning stages. Measurement and collection techniques are still being developed, and contaminants being identified. Much more information is needed about the migration and persistence of contaminants, current levels in water, what levels may pose a hazard to human or environmental health, and interactivity of contaminants and possible health effects.

Other Federal Activity

The Centers for Disease Control and Prevention (CDC) are developing a national Environmental Public Health Tracking (EPHT) Program to draw together human biomonitoring information in a national registry. Water

monitoring data will be an important part of this effort. In New Hampshire, the state EPHT program is working with the CDC biomonitoring program to study the levels of arsenic in drinking water. This data will be used in the state program to track arsenic exposure and incidence of bladder cancer. The New York State biomonitoring program plans to work with the EPHT on a pilot-scale biomonitoring project relating to drinking water contaminants (e.g., trihalomethanes or other disinfection byproducts) and birth outcome data.

Human activities from heavy industry to farming to housecleaning and personal care make an impact on the fresh water supply. Water monitoring is a complex, interdisciplinary area of study: increased activity and collaboration in this area is a welcome development.

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References and Resources:

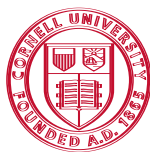
Kolpin, D. W. et al. (2002). Pharmaceuticals, Hormones, and Other Wastewater Contaminants in US Streams, 1999-2000: A National Reconnaissance. *Environmental Science and Technology*, 36: 1202-1211. (available on line: http://pubs.acs.org/hotartcl/est/es011055j_rev.html)

USGS Websites and On-line Publications

USGS Water Resources webpage:	http://water.usgs.gov/
USGS NAWQA Program:	http://water.usgs.gov/nawqa/
USGS Water Quality Glossary:	http://water.usgs.gov/nawqa/glos.html
USGS Toxics Program:	http://toxics.usgs.gov/about.html
USGS BEST Program:	http://www.best.usgs.gov/default.htm

USGS Emerging Contaminants Project:	http://toxics.usgs.gov/regional/emc/
USGS Emerging Contaminants Fact Sheet:	http://toxics.usgs.gov/pubs/FS-027-02/ (HTML and PDF version available on this page)

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